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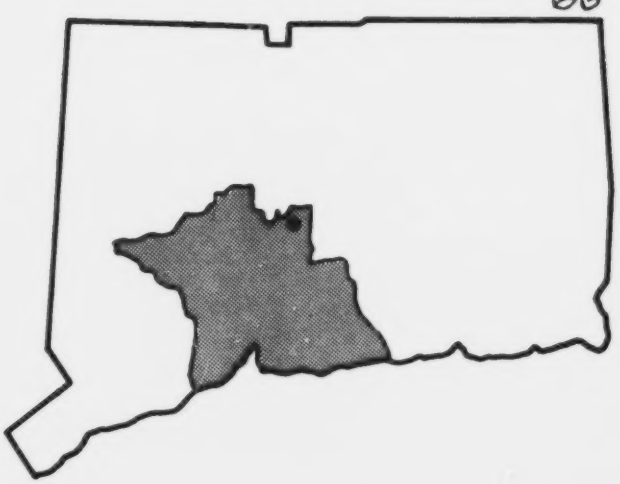
JUN 28 1982

FLOOD INSURANCE STUDY

ORIGINAL

COMPLETED 66

CITY OF MERIDEN, CONNECTICUT
NEW HAVEN COUNTY



MARCH 30, 1982

Federal Emergency Management Agency

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Exhibit 3 - Flood Boundary and Floodway Map

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index

Flood Insurance Rate Map

FLOOD INSURANCE STUDY
CITY OF MERIDEN, CONNECTICUT

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Meriden, New Haven County, Connecticut, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert Meriden to the regular program of flood insurance by the Federal Emergency Management Agency (FEMA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these federally-supported studies are based. These criteria take precedence over the minimum federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.3. In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by the U. S. Geological Survey for the Federal Emergency Management Agency, under Inter-Agency Agreement No. IAA-H-9-77, Project Order No. 27. This work was completed in December 1979.

1.3 Coordination

On June 14, 1977, streams requiring detailed study were identified at an initial Consultation and Coordination Officer's (CCO) meeting attended by representatives of the FEMA, the City of Meriden, and the U. S. Geological Survey (USGS - the study contractor). An intermediate CCO meeting was held on January 9, 1980. On June 12, 1981, the results of the study were reviewed at a final CCO meeting held with representatives of the FEMA, the city, and the USGS.

2.0 AREA STUDIED

2.1 Scope of Study

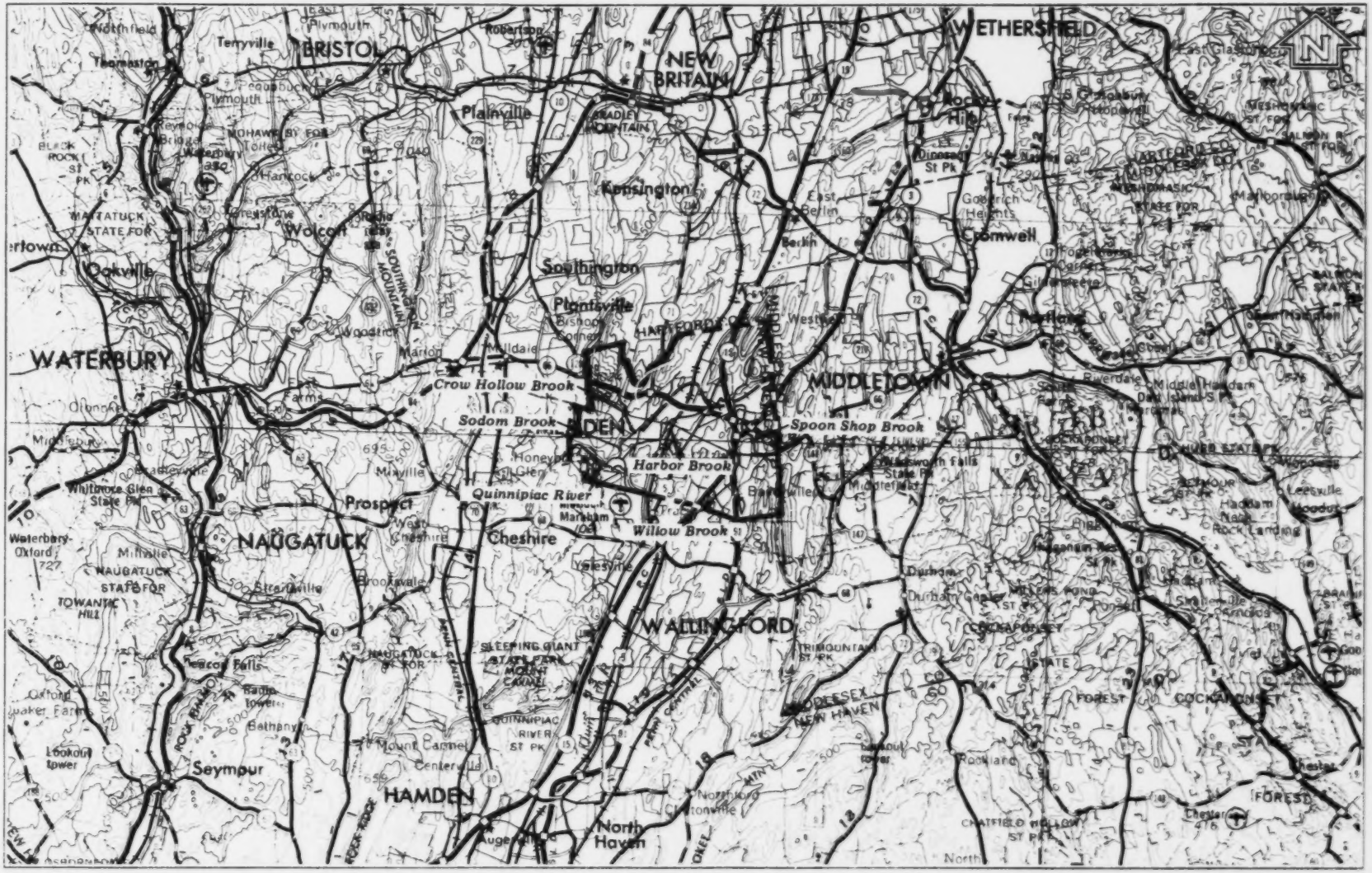
This Flood Insurance Study covers the incorporated area of the City of Meriden, New Haven County, Connecticut. The area of study is shown on the Vicinity Map (Figure 1).

The following streams were studied by detailed methods: the entire lengths of the Quinnipiac River and Harbor Brook within Meriden; Sodom Brook from the confluence with the Quinnipiac River to a point approximately 3,520 feet upstream of the Leonard Street crossing; Spoon Shop Brook from the confluence with Harbor Brook to the Birdsey Avenue crossing; Willow Brook from the confluence with Harbor Brook to a point approximately 950 feet upstream of the Murdock Avenue crossing; Crow Hollow Brook from the confluence with Sodom Brook to a point approximately 1,830 feet upstream of Johnson Avenue. An area of shallow flooding exists on Harbor Brook between Mill Street and West Main Street (Meriden Mall). This area has been included in the detailed analysis for Harbor Brook. The Quinnipiac River is known as Hanover Pond in the area of the confluence of Sodom Brook and Harbor Brook. Harbor Brook is known as Baldwin's Pond at the confluence of Spoon Shop Brook and Willow Brook. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction for the next five years, through December 1984.

The upstream portions of Sodom Brook, Spoon Shop Brook, Willow Brook, and Crow Hollow Brook were studied by approximate methods. East Branch Sodom Brook, North Branch Spoon Shop Brook, Clark Brook, Meetinghouse Brook, Bradley Hubbard Reservoir, Merimere Reservoir, Silver Lake, Beaver Pond, and Foster Pond were also studied by approximate methods. Approximate methods of analysis were used to study those areas having low development potential and minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by the FEMA.

2.2 Community Description

The City of Meriden is located in the northern portion of New Haven County in central Connecticut, approximately 18 miles from the City of Hartford. It is bordered by the Town of Berlin to the north, the Towns of Middlefield and Middletown to the east, the Town of Wallingford to the south, and the Towns of Cheshire and Southington to the west. Meriden has a population of approximately 56,200 (Reference 1). The total land area contained within the city limits is 24 square miles, with a population density of 2,342 persons per square mile.


BRISTOL
NEW BRITAIN
WETHERSFIELD
Plainville
Kensington
Southington
Plantsville
WATERBURY
Oakville
Wolcott
Cheshire
Prospect
NAUGATUCK
MIDDLETOWN
Cromwell
Berlin
Crow Hollow Brook
Sodom Brook
Spoon Shop Brook
Harbor Brook
Quinnipiac River
Willow Brook
WALLINGFORD
HAMDEN
Seymour
North Haven
Durham
Rockland
Leesville
Woodsor
Hackam
Rock Landing
Meriden
Middletown
Durham
Cheshire
Wallingford
Hamden
Seymour
North Haven

The climate of Meriden is moderate and is characterized by the even distribution of approximately 45 inches of annual rainfall, large ranges of both annual and daily temperatures, and a considerable variety of weather in short periods of time (Reference 2). The topography ranges from gently rolling terrain in the stream valleys to steep hilly terrain in several upland areas. The Meriden land area consists mainly of soil developed on well drained, glacial stratified drift in the valleys, and glacial till and bedrock in the uplands.

Meriden is heavily urbanized. Flood plain development is extensive in all downstream areas of the streams studied in detail.

The Quinnipiac River, with a drainage area of 96 square miles at the downstream corporate limits, is Meriden's largest stream. Crow Hollow Brook, Harbor Brook, Sodom Brook, Spoon Shop Brook, and Willow Brook are the major tributaries. Continuing economic development in the basins of these streams is expected, and pressures leading to intensified flood plain use will undoubtedly accompany such development.

2.3 Principal Flood Problems

Floods in Meriden have occurred in every season of the year. Spring floods are common and are caused by rainfall in combination with snowmelt. Floods in late summer and fall are usually the result of hurricanes or other storms moving northeast along the Atlantic coast. Winter floods result from occasional thaws, particularly in years of heavy snowfall.

Major floods of the past 50 years occurred in Meriden in March 1936, January and September 1938, January 1949, and August and October 1955. Of these, the hurricane-caused flood of September 1938 was by far the most severe. Streamflow records at the USGS gaging station on the Quinnipiac River in Wallingford indicate that the September 1938 flood was equivalent to a flood having a recurrence interval of about 100 years.

2.4 Flood Protection Measures

Several reaches of Meriden's streams are enclosed within walls, or in conduits, and more protection of this type is planned for the immediate future. Harbor Brook has undergone channel improvements, particularly in the Glen Hills Road area.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard

data for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one-percent chance of annual occurrence) in any 50-year period is about 40 percent (four in ten) and, for any 90-year period, the risk increases to about 60 percent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail affecting the community.

For the Quinnipiac River, flood flow frequency data were based on the statistical analysis of streamflow records covering a 40-year period at the gaging station downstream of Meriden in Wallingford. The analysis followed the log-Pearson Type III method as outlined by the Water Resources Council (Reference 3).

For the remaining streams studied by detailed methods, 10-, 50-, 100-, and 500-year peak discharges were determined by a regression analysis. Discharges were related to basin characteristics such as drainage area, stream length, streambed slope, and rainfall parameters as described in a statewide flood flow formula determination (Reference 4).

A summary of drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges".

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
QUINNIPIAC RIVER					
At the downstream corporate limits	96.0	3,300	5,200	6,000	8,000
Upstream of Hanover Pond	76.0	2,800	4,400	5,100	6,800

TABLE 1 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
SODOM BROOK					
At the confluence with Quinnipiac River	5.5	400	850	1,200	1,700
Upstream of Crow Hollow Brook	3.8	250	520	760	1,100
Upstream of West Main Street	3.1	225	465	685	1,000
Upstream of Springdale Street	2.6	190	400	630	900
Upstream of Conrail	2.1	150	350	575	820
Upstream of State Route 66	1.5	110	270	450	660
Upstream of Kensington Avenue	1.1	80	200	300	450
HARBOR BROOK					
At the confluence with Quinnipiac River	12.1	700	1,500	2,200	3,200
Upstream of Cedar Street	10.4	600	1,300	1,950	2,700
Upstream of Broad Street	8.6	500	1,100	1,650	2,300
Upstream of Baldwin Pond	7.8	450	1,000	1,450	2,000
SPOON SHOP BROOK					
At the confluence with Harbor Brook	3.8	200	450	650	900
Upstream of Maple Avenue	3.1	160	360	520	720
WILLOW BROOK					
At the confluence with Harbor Brook	3.3	250	550	800	1,100
Upstream of Interstate 91	2.0	150	350	450	750
Upstream of East Road	1.0	100	200	250	400
CROW HOLLOW BROOK					
At the confluence with Sodom Brook	1.4	150	330	440	600
At West Main Street	1.0	105	230	310	400
At Notch Road	0.4	45	100	130	180

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in detail were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of these flooding sources.

BEST DOCUMENT AVAILABLE

Cross sections for the backwater analyses for all streams studied in detail were field surveyed and located at intervals to evaluate normal channel losses and the effects of all manmade structures such as dams, culverts, and bridges located in the flood plain. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.

Water-surface elevations of floods of the selected recurrence intervals were computed through the use of the USGS step-backwater computer program (Reference 5). Starting water-surface elevations for the Quinnipiac River were obtained from the Flood Insurance Study for the Town of Wallingford (Reference 6). Starting water-surface elevations for Harbor Brook and Sodom Brook were taken from the initially determined Quinnipiac River profile at the respective points of confluence. Starting water-surface elevations for Spoon Shop Brook and Willow Brook were taken from the Harbor Brook profile. Starting water-surface elevations for Crow Hollow Brook were taken from the Sodom Brook profile.

Channel roughness coefficients (Manning's "n") used in the hydraulic computations were assigned on the basis of field inspection of flood plain areas. Roughness values for the streams studied by detailed methods are shown in the following tabulation:

Stream	Channel "n"	Overbank "n"
Quinnipiac River	0.035	0.035-0.070
Sodom Brook	0.025-0.040	0.025-0.070
Harbor Brook	0.035-0.040	0.035-0.070
Spoon Shop Brook	0.020-0.040	0.020-0.070
Willow Brook	0.025-0.040	0.025-0.070
Crow Hollow Brook	0.035-0.040	0.070

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway is computed (Section 4.2), selected cross-section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 3).

All elevations used in this study are referenced to the National Geodetic Vertical Datum of 1929 (NGVD), formerly referred to as Sea Level Datum of 1929. Locations of the elevation reference marks used in the study are shown on the maps.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are valid only if hydraulic structures remain unobstructed and do not fail.

For the areas studied by approximate methods, water-surface elevations were estimated using normal depth calculations.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FEMA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24,000 with a contour interval of 10 feet (Reference 7). In cases where the 100- and 500-year flood boundaries are close together, only the 100-year boundary has been shown.

For the areas studied by approximate methods, the boundary of the 100-year flood was delineated using USGS topographic maps and the Flood Hazard Boundary Map for the City of Meriden (References 7 and 8).

In some instances, flood hazard areas caused by high intensity precipitation can exist, even though floods with recurrence intervals of 100 years and less are contained in the river channels or drainage conduit. Such a situation exists on Harbor Brook between Mill Street and West Main Street. Floods on Harbor Brook with recurrence intervals up to 100 years are contained within twin culverts under the Meriden Mall area. However, intense rainfall, such as that which occurred on October 3, 1979, created a flood hazard area, as determined by high-water marks (Reference 9). This shallow flooding area (Zone AH) is shown on the Flood Boundary and Floodway Map (Exhibit 3).

A portion of the detailed flooding on Crow Hollow Brook just downstream of the West Main Street bridge is diverted from the main stream channel and proceeds to the confluence with Sodom Brook. This diversionary flow results from floodwaters being routed around both sides of a shopping center which has been determined to sustain minimal flooding. Flood elevations and their corresponding boundaries in this area were determined using the topographic maps referenced above and engineering judgment.

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 3). Small areas within the flood boundaries may lie above the flood elevations and, therefore, may not be subject to flooding. Owing to limitations of the map scale and lack of detailed topographic data, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood can be carried without substantial increases in flood heights. Minimum standards of the FEMA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plains. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 3), the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown. Portions of the floodway widths for the Quinnipiac River extend beyond the corporate limits.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Quinnipiac River								
A	0[1]	230[3]	2,417	2.5	72.8	72.8	73.8	1.0
B	1,900[1]	170	2,525	2.4	74.7	74.7	75.3	0.6
C	4,100[1]	131	686	8.8	78.3	78.3	78.4	0.1
D	4,950[1]	870	6,918	0.9	90.7	90.7	91.7	1.0
E	6,600[1]	1,400	8,284	0.7	90.8	90.8	91.8	1.0
F	9,200[1]	203	1,271	4.0	91.2	91.2	91.9	0.7
G	11,150[1]	208	1,011	5.0	94.9	94.9	94.9	0.0
H	12,900[1]	169	762	6.7	98.8	98.8	98.8	0.0
I	16,200[1]	159	1,051	4.8	107.6	107.6	108.6	1.0
Sodom Brook								
A	0[2]	115	597	2.0	90.8	90.8	91.7	0.9
B	3,600[2]	65	362	3.3	98.6	98.6	99.4	0.8
C	3,710[2]	144	1,110	0.7	100.0	100.0[4]	100.4	0.4
D	5,200[2]	114	211	3.2	106.0	100.3[4]	100.7	0.4
E	6,950[2]	53	132	5.2	120.3	120.3	120.3	0.0
F	8,770[2]	28	92	6.9	127.7	127.7	127.7	0.0

[1]Feet from corporate limits

[2]Feet above confluence with Quinnipiac River

[3]This width extends beyond corporate limits

[4]Elevation computed without consideration of backwater effects from Crow Hollow Brook

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

FLOODWAY DATA

QUINNIPIAC RIVER AND SODOM BROOK

BEST DOCUMENT AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Sodom Brook (continued)								
G	9,030	113	392	1.6	129.5	129.5	129.7	0.2
H	10,000	135	452	1.3	129.8	129.8	130.1	0.3
I	11,090	200	849	0.7	130.6	130.6	130.9	0.3
J	12,300	200	624	0.7	134.6	134.6	134.6	0.0
K	12,800	200	475	1.0	137.2	137.2	137.2	0.0
L	13,340	65	186	1.6	139.0	139.0	139.1	0.1
M	15,250	33	45	6.7	152.1	152.1	152.1	0.0
N	16,850	50	111	2.7	163.0	163.0	163.1	0.1
Harbor Brook								
A	0	60	322	6.8	90.8	90.8	91.8	1.0
B	2,340	50	659	3.3	97.5	97.5	98.5	1.0
C	2,540	50	337	6.5	97.7	97.7	98.7	1.0
D	2,840	65	400	5.5	99.2	99.2	99.7	0.5
E	3,410	61	245	9.0	101.3	101.3	102.0	0.7
F	3,730	164	507	4.3	105.9	105.9	105.9	0.0
G	4,930	42	334	6.6	113.9	113.9	113.9	0.0
H	6,230	52	450	4.9	119.1	119.1	119.1	0.0

[1]Feet above confluence with Quinnipiac River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

FLOODWAY DATA

SODOM BROOK AND HARBOR BROOK

BEST DOCUMENT AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Harbor Brook (continued)								
I	8,125	117	1156	1.9	120.7	120.7	120.8	0.1
J	8,550	251	1,484	1.5	120.9	120.9	121.2	0.3
K	9,400	43	446	4.9	121.1	121.1	121.5	0.4
L	9,900	210	1,368	1.6	122.7	122.7	122.9	0.2
M	10,190	334	2,085	1.1	122.8	122.8	123.0	0.2
N	10,400	368	2,023	1.1	122.8	122.8	123.0	0.2
O	10,845	111	517	4.3	123.4	123.4	123.6	0.2
P	13,700	41	287	6.8	130.6	130.6	130.6	0.0
Q	13,980	51	230	8.5	131.4	131.4	131.4	0.0
R	14,440	65	317	6.1	135.7	135.7	135.8	0.1
S	15,120	210	558	3.5	141.2	141.2	142.0	0.8
T	16,260	121	718	2.7	144.3	144.3	145.2	0.9
U	18,000	53	327	5.1	157.8	157.8	157.9	0.1
V	18,940	77	471	3.5	168.5	168.5	168.5	0.0
W	20,160	489	2,531	0.7	179.6	179.6	179.6	0.0
X	21,200	190	1,480	1.1	198.1	198.1	199.0	0.9

[1]Feet above confluence with Quinnipiac River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

FLOODWAY DATA

HARBOR BROOK

BEST DOCUMENT AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE [1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Spoon Shop Brook								
A	0	152	1,042	0.6	200.8	200.8	201.3	0.5
B	3,000	18	81	8.1	223.7	223.7	224.7	1.0
C	3,480	124	606	1.1	230.7	230.7	230.8	0.1
D	5,500	30	77	8.5	232.3	232.3	232.5	0.2
E	6,820	70	229	2.8	244.8	244.8	244.8	0.0
F	8,250	28	67	7.8	252.3	252.3	252.4	0.1
G	9,880	167	432	1.2	274.3	274.3	274.3	0.0
H	12,120	160	466	1.1	285.9	285.9	285.9	0.0
I	13,760	113	413	1.3	319.0	319.0	319.0	0.0
J	14,280	178	449	1.2	343.1	343.1	343.1	0.0
K	15,300	47	74	7.0	369.0	369.0	369.0	0.0
Willow Brook								
A	0	253	1,609	0.5	200.8	200.8	201.3	0.5
B	700	45	172	4.7	200.9	200.9	201.3	0.4
C	1,220	59	107	7.4	205.6	205.6	205.6	0.0
D	1,850	50	224	3.6	225.5	225.5	225.5	0.0
E	2,800	27	83	9.6	237.4	237.4	237.4	0.0

[1]Feet above confluence with Harbor Brook

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

FLOODWAY DATA

SPOON SHOP BROOK AND WILLOW BROOK

BEST DOCUMENT AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Willow Brook (continued)								
F	3,780[1]	17	70	11.4	256.6	256.6	256.6	0.0
G	7,030[1]	37	175	2.6	273.5	273.5	273.9	0.4
H	8,190[1]	43	165	2.7	274.8	274.8	275.2	0.4
I	9,540[1]	41	145	3.1	277.7	277.7	277.9	0.2
J	10,160[1]	170	322	1.4	278.7	278.7	279.5	0.8
K	12,320[1]	253	266	0.9	281.1	281.1	282.1	1.0
L	14,380[1]	29	90	2.8	286.5	286.5	286.9	0.4
M	15,220[1]	32	44	5.7	290.2	290.2	290.2	0.0
Crow Hollow Brook								
A	1,310[2]	25	59	7.5	127.2	127.2	127.2	0.0
B	1,710[2]	30	187	5.1	130.2	130.2	130.5	0.3
C	2,750[2]	19	53	8.3	139.5	139.5	139.7	0.2
D	3,730[2]	101	60	7.3	167.7	167.7	167.7	0.0
E	4,200[2]	27	94	4.7	177.6	177.6	178.4	0.8
F	4,680[2]	24	59	7.5	192.5	192.5	192.5	0.0

[1]Feet above confluence with Harbor Brook
[2]Feet above confluence with Sodom Brook

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

FLOODWAY DATA

WILLOW BROOK AND CROW HOLLOW BROOK

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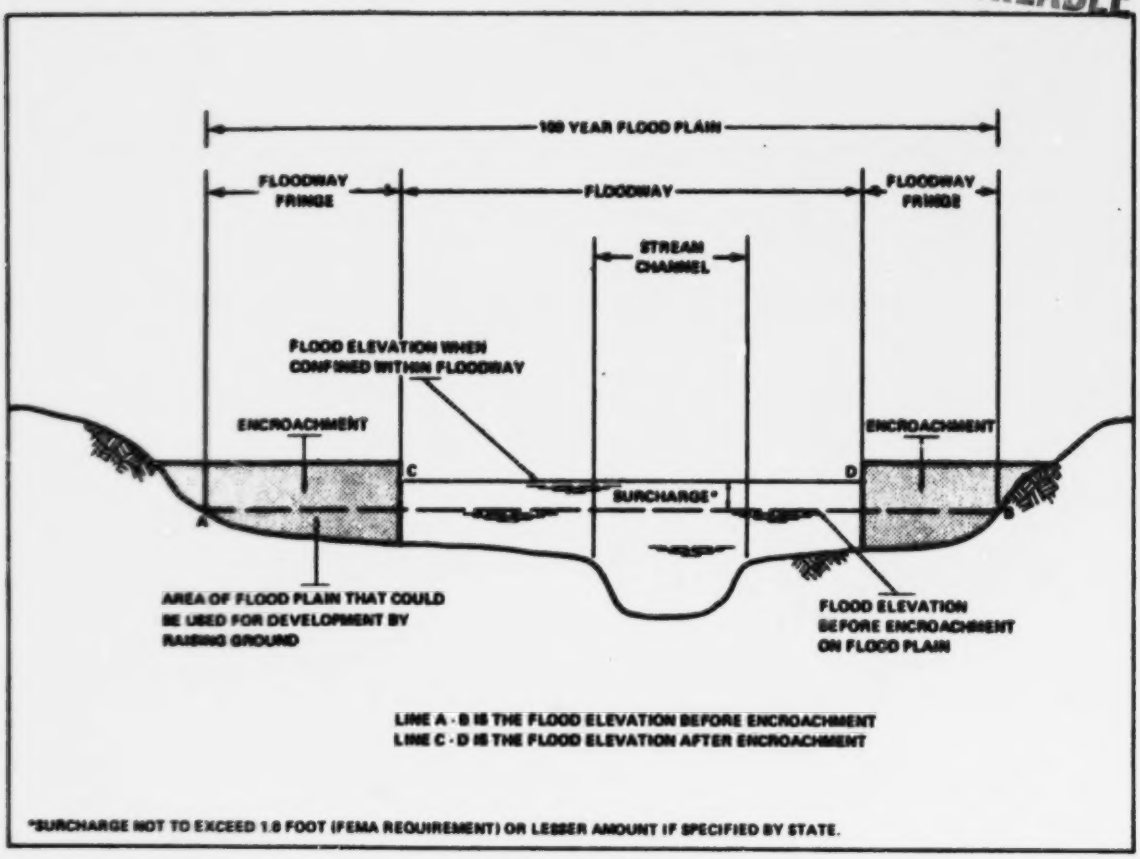
100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FLOODWAY SCHEMATIC Figure 2

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "With Floodway" elevations presented in Table 2 for certain downstream cross sections of Sodom Brook are lower than the regulatory flood elevations in that area, which must take into account the 100-year flooding due to backwater from other sources.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FEMA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each flooding source affecting the City of Meriden.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the flooding sources of the City of Meriden are shown on the Flood Profiles (Exhibit 1) and are summarized in the Flood Insurance Zone Data Table (Table 3).

5.2 Flood Hazard Factors

The FHF is the FEMA device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest 0.5 foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the City of Meriden was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A: Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Quinnipiac River							
Reach 1	03,05	-1.9	-0.6	+1.3	020	A4	Varies
Sodom Brook							
Reach 1	03	-1.8	-0.8	+1.0	020	A4	Varies
Reach 2	03	-1.9	-0.8	+1.0	020	A4	Varies
Reach 3	03,04	-2.4	-0.9	+0.8	025	A5	Varies
Reach 4	02,04	-1.3	-0.4	+0.3	015	A3	Varies
Harbor Brook							
Reach 1	03	-2.1	-0.9	+1.0	020	A4	Varies
Reach 2	03	-3.4	-1.6	+1.6	035	A7	Varies
Reach 3	03	-4.3	-1.8	+2.2	045	A9	Varies
Reach 4	03,04	-5.5	-1.6	+3.4	055	A11	Varies
Between Cedar Street and Perkins Street	04		Shallow	Flooding		AH	128
Reach 5	04	-3.7	-1.2	+0.6	035	A7	Varies
Reach 6	04	-3.2	-1.2	+1.2	030	A6	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

FLOOD INSURANCE ZONE DATA

QUINNIPIAC RIVER, SODOM BROOK AND HARBOR BROOK

BEST DOCUMENT AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Harbor Brook (continued)							
Reach 7	04	-1.8	-0.8	+0.5	020	A4	Varies
Reach 8	04	-3.2	-1.9	+1.9	030	A6	Varies
Spoon Shop Brook							
Reach 1	04	-2.8	-1.0	+1.5	030	A6	Varies
Reach 2	04	-5.8	-3.8	+0.6	060	A12	Varies
Reach 3	04	-4.0	-3.3	+1.1	040	A8	Varies
Reach 4	04	-2.7	-0.9	+1.5	025	A5	Varies
Reach 5	04	-3.3	-0.3	+1.0	035	A7	Varies
Reach 6	04	-1.3	-0.3	+0.6	015	A3	Varies
Reach 7	04	-4.5	-0.7	+0.4	045	A9	Varies
Reach 8	04,06	-1.9	-0.4	+0.5	020	A4	Varies
Reach 9	06	-3.5	-0.3	+0.3	035	A7	Varies
Reach 10	06	-1.9	-0.8	+0.3	020	A4	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

FLOOD INSURANCE ZONE DATA

HARBOR BROOK AND SPOON SHOP BROOK

BEST DOCUMENT AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Willow Brook							
Reach 1	04	-3.0	-1.5	+1.8	030	A6	Varies
Reach 2	04	-4.0	-2.6	+1.4	040	A8	Varies
Reach 3	04,06	-2.3	-1.0	+1.2	025	A5	Varies
Reach 4	06	-1.0	-0.4	+0.8	010	A2	Varies
Reach 5	06	-1.6	-0.8	+1.3	015	A3	Varies
Crop Hollow Brook							
Reach 1	03	-4.1	-1.1	+0.7	040	A8	Varies
Reach 2	03	-1.5	-0.5	+0.5	015	A3	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

FLOOD INSURANCE ZONE DATA

WILLOW BROOK AND CROP HOLLOW BROOK

BEST DOCUMENT AVAILABLE

Zone AH:	Special Flood Hazard Areas inundated by types of 100-year shallow flooding where depths are between 1.0 and 3.0 feet; base flood elevations are shown, but no FHFs are determined.
Zones A2, A3, A4, A5, A6, A7, A8, A9, A11 and A12:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHF.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; also, areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding sources studied in detail in the City of Meriden.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of Meriden is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FEMA.

6.0 OTHER STUDIES

Flood Insurance Studies for the Towns of Wallingford, Berlin, Middlefield, and Middletown have been completed (References 6, 10, 11, and 12). The results of this study are in exact agreement with the results of those studies. The Flood Hazard Boundary Map for the City of Meriden has been published (Reference 8).

Flood Insurance Studies for the Towns of Cheshire and Southington are currently being prepared (References 13 and 14). The results of those studies will be in exact agreement with the results of this study.

This study is authoritative for purposes of the Flood Insurance Program, and the data presented here either supersede or are compatible with previous determinations.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the office of the Insurance and Mitigation Division of the Federal Emergency Management Agency, Regional Director, Region I Office, J. W. McCormack Post Office and Courthouse Building, Room 462, Boston, Massachusetts 02109.

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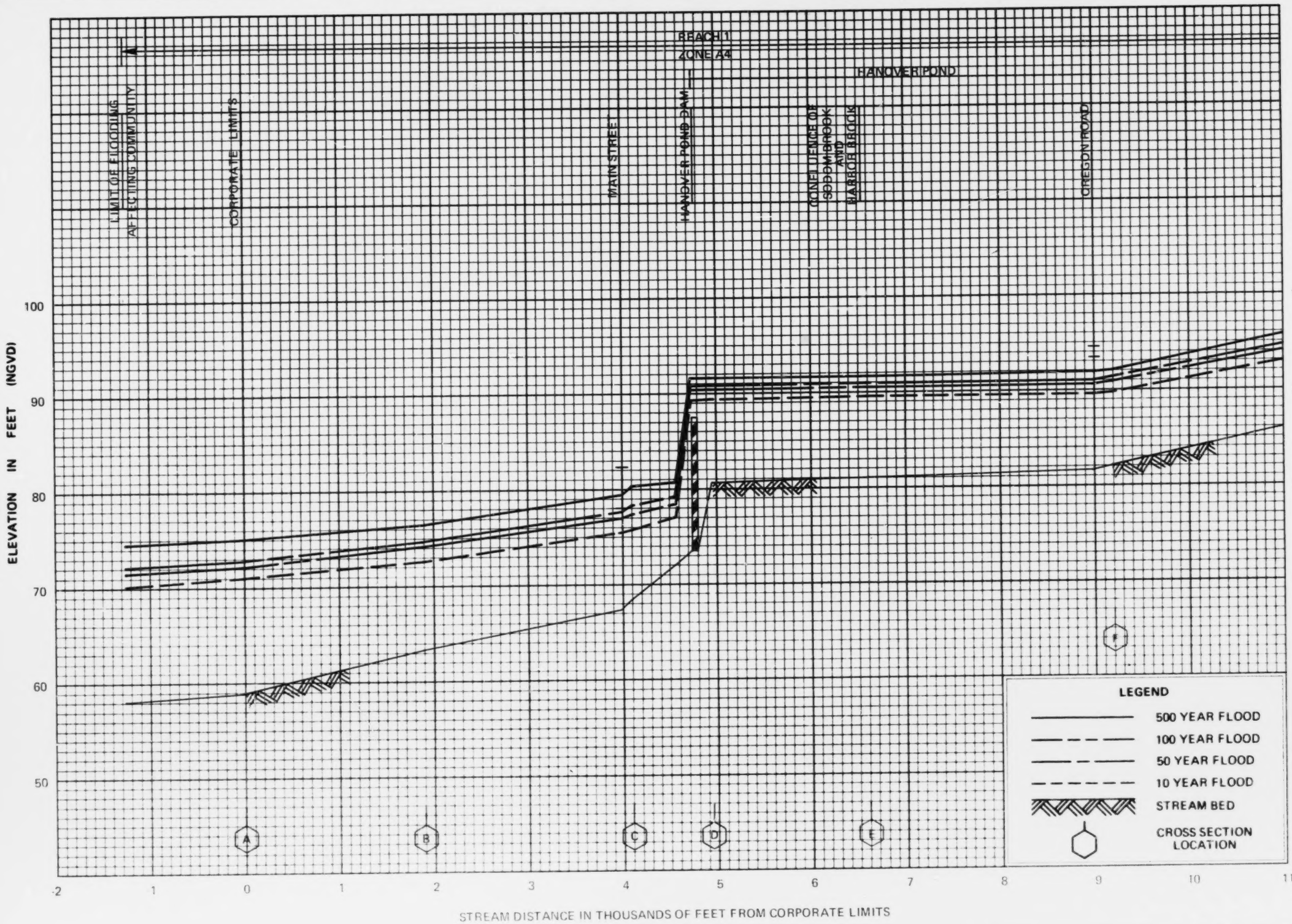
14. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Town of Southington, Hartford County, Connecticut (Unpublished).



FLOOD PROFILES

QUINNIPIAC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

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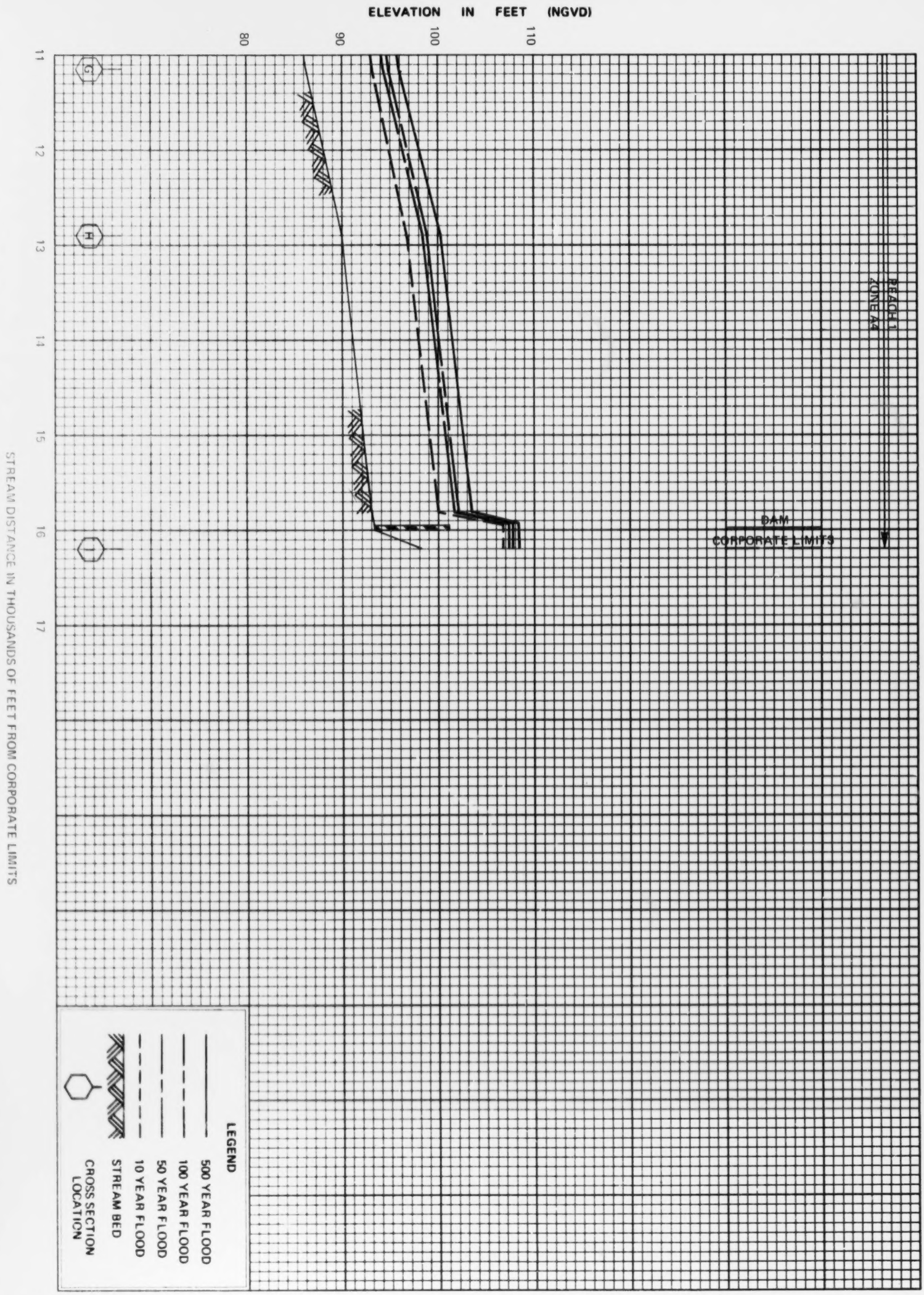

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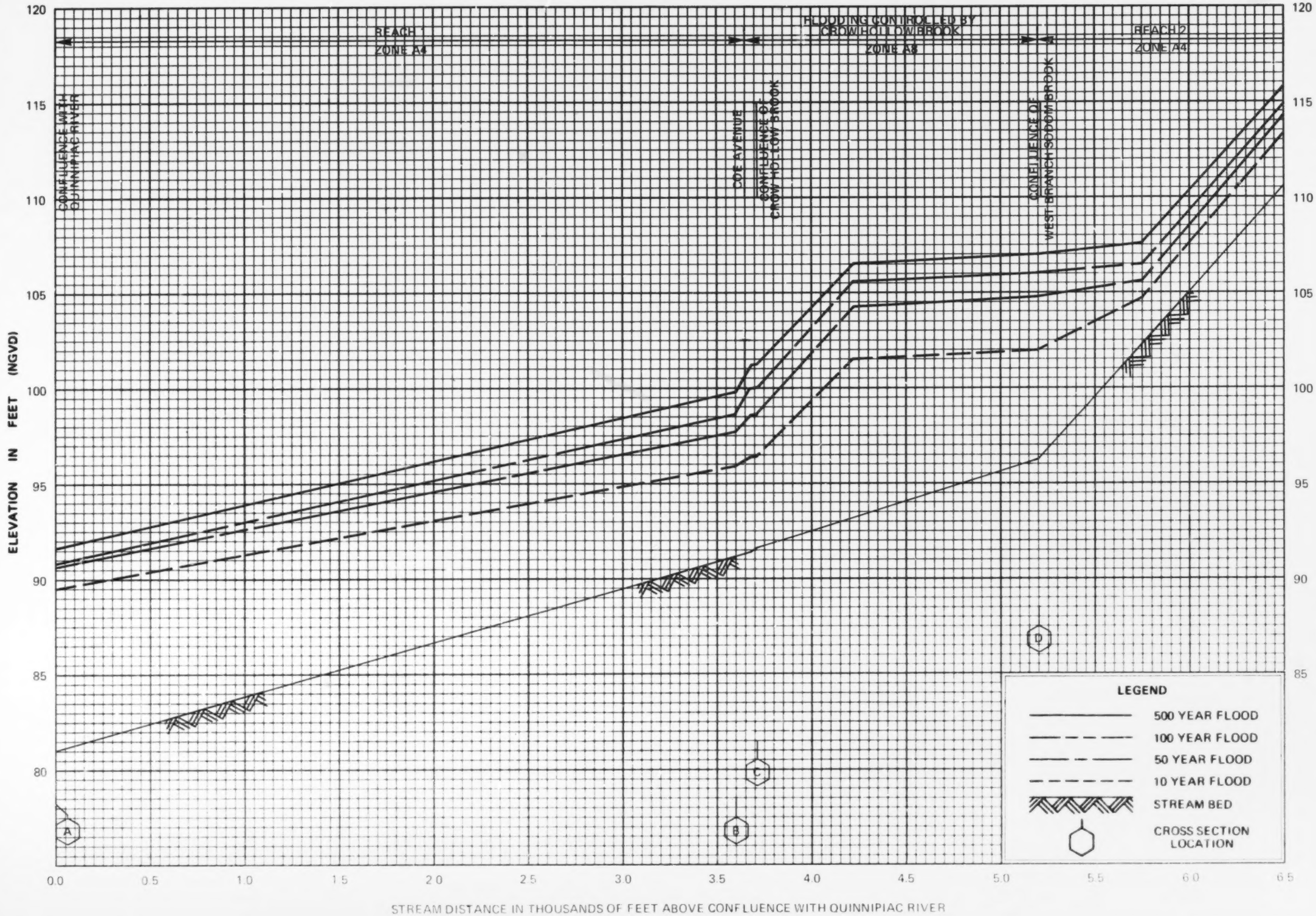

FLOOD PROFILES

SODOM BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

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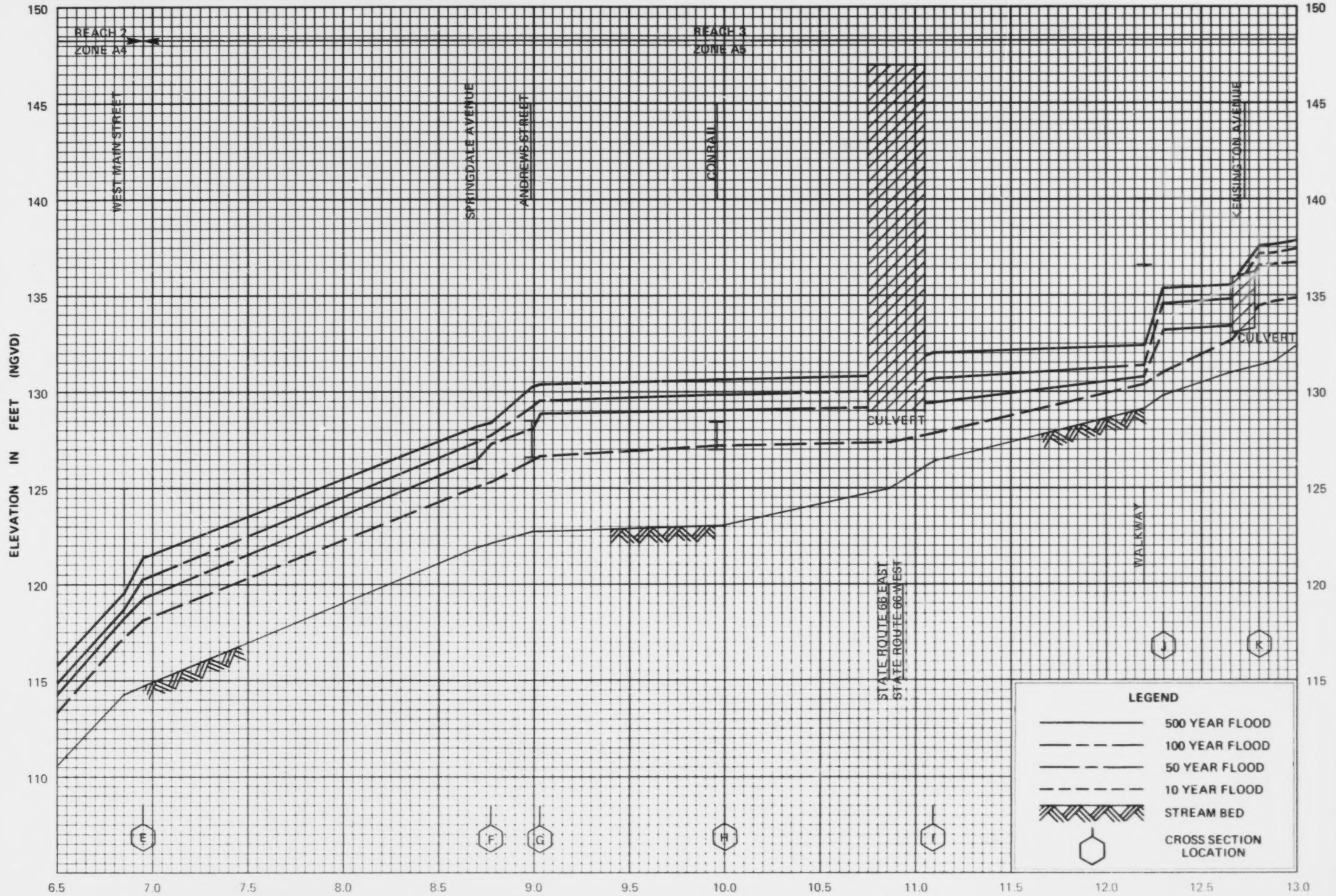

FLOOD PROFILES

SODOM BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

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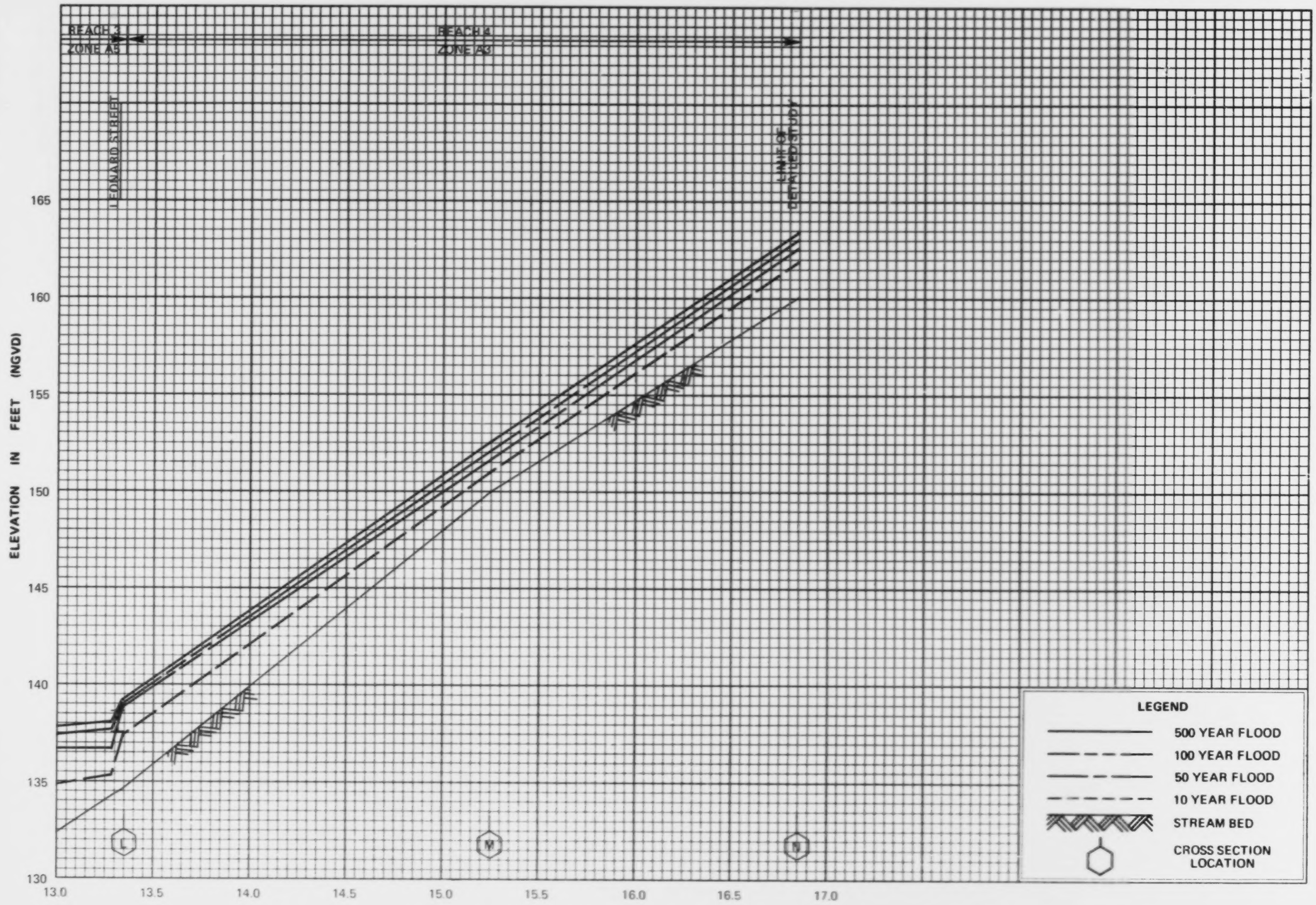

FLOOD PROFILES

SODOM BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

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REACH 1
ZONE A4

REACH 2
ZONE A7

REACH 3
ZONE A9

REACH 4
ZONE A11

CONFLUENCE WITH QUINNIPIAC RIVER

COE AVENUE

BRADLEY AVENUE

HANOVER STREET

COLUMBUS AVENUE

COOK AVENUE

MERIDIAN STREET EXTENDED

COOPER STREET

TRANSFORMER

FACTORY

LEONARD STREET

CONRAIL

CULVERT

CULVERT

BEGINNING OF SHALLOW FLOODING

ELEVATION IN FEET (NGVD)

130
120
110
100
90
80

LEGEND

500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
CROSS SECTION LOCATION

A B C D E F G H I J K L M N O

0 1 2 3 4 5 6 7 8 9 10 11 12

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE CONFLUENCE WITH QUINNIPIAC RIVER

FLOOD PROFILES

HARBOR BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

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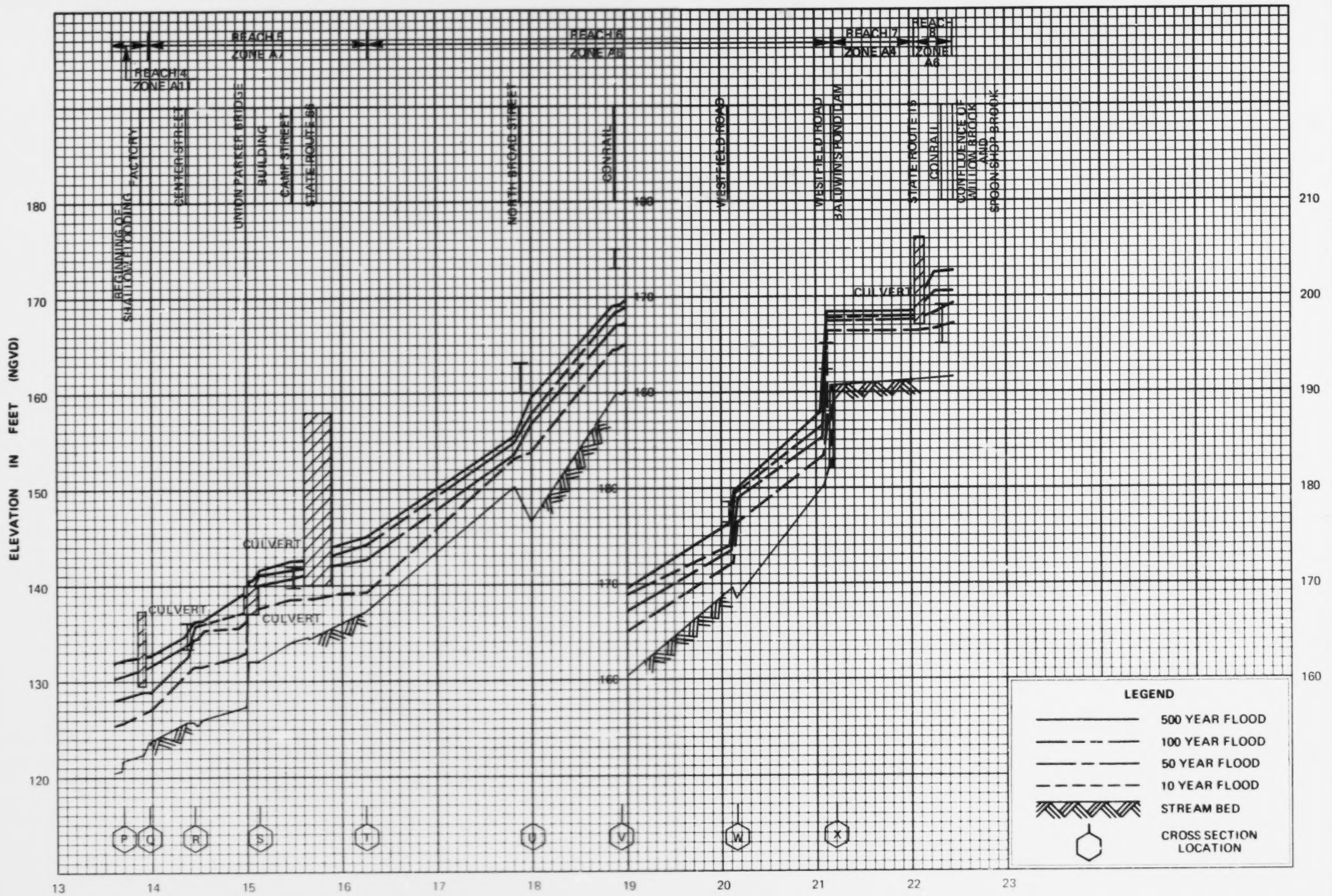

FLOOD PROFILES

HARBOR BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

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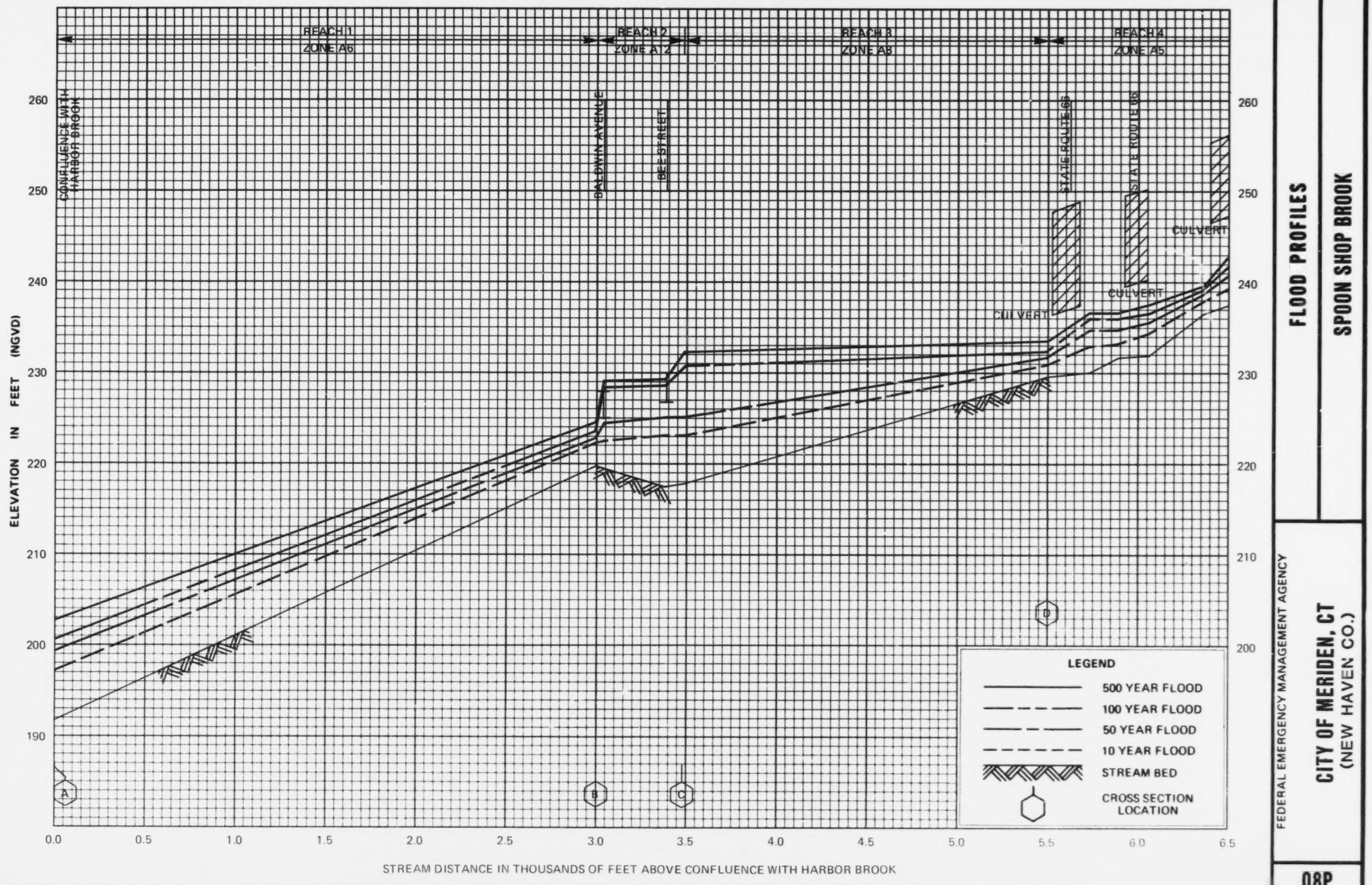

FLOOD PROFILES

SPOON SHOP BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

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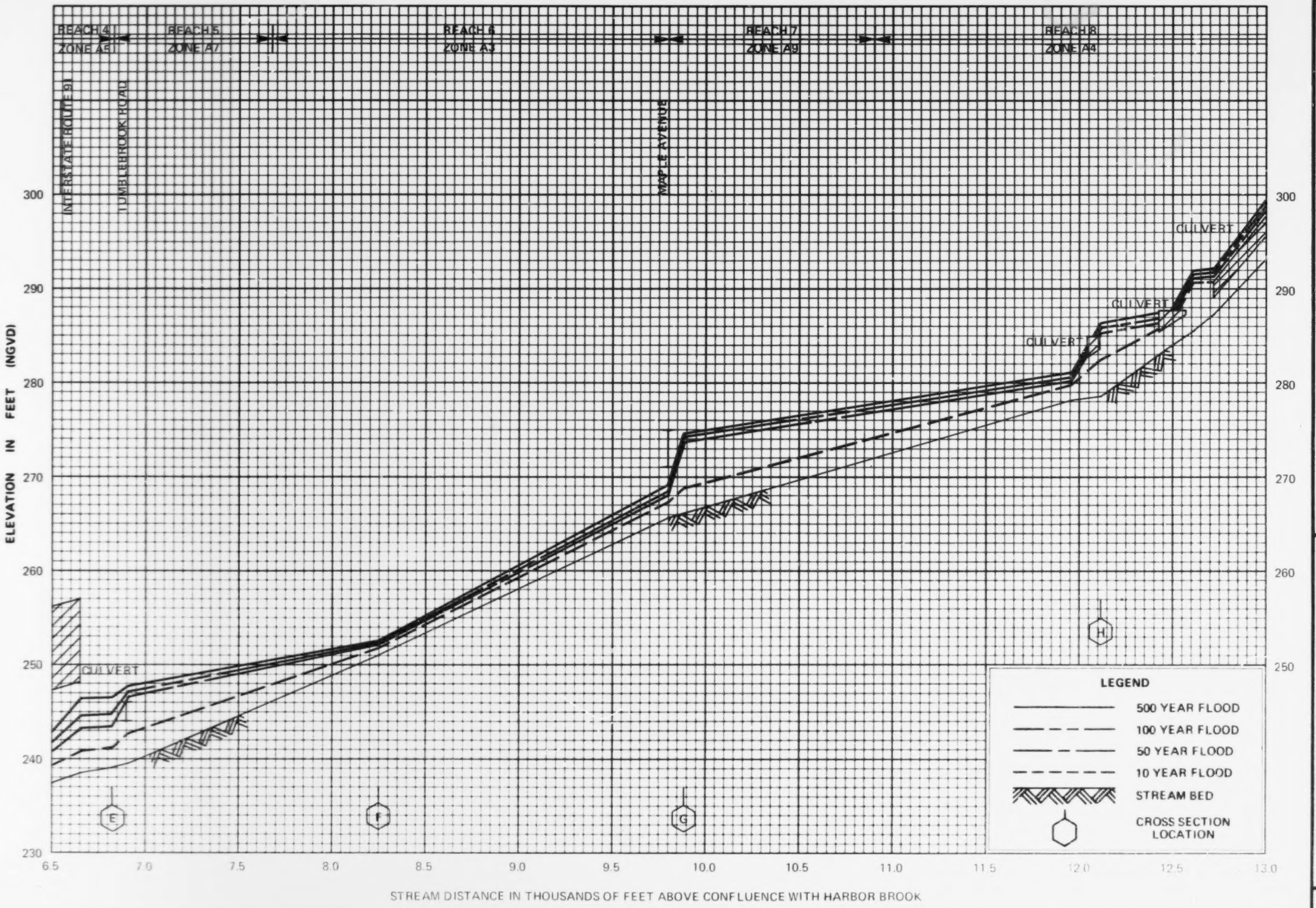

FLOOD PROFILES

SPOON SHOP BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

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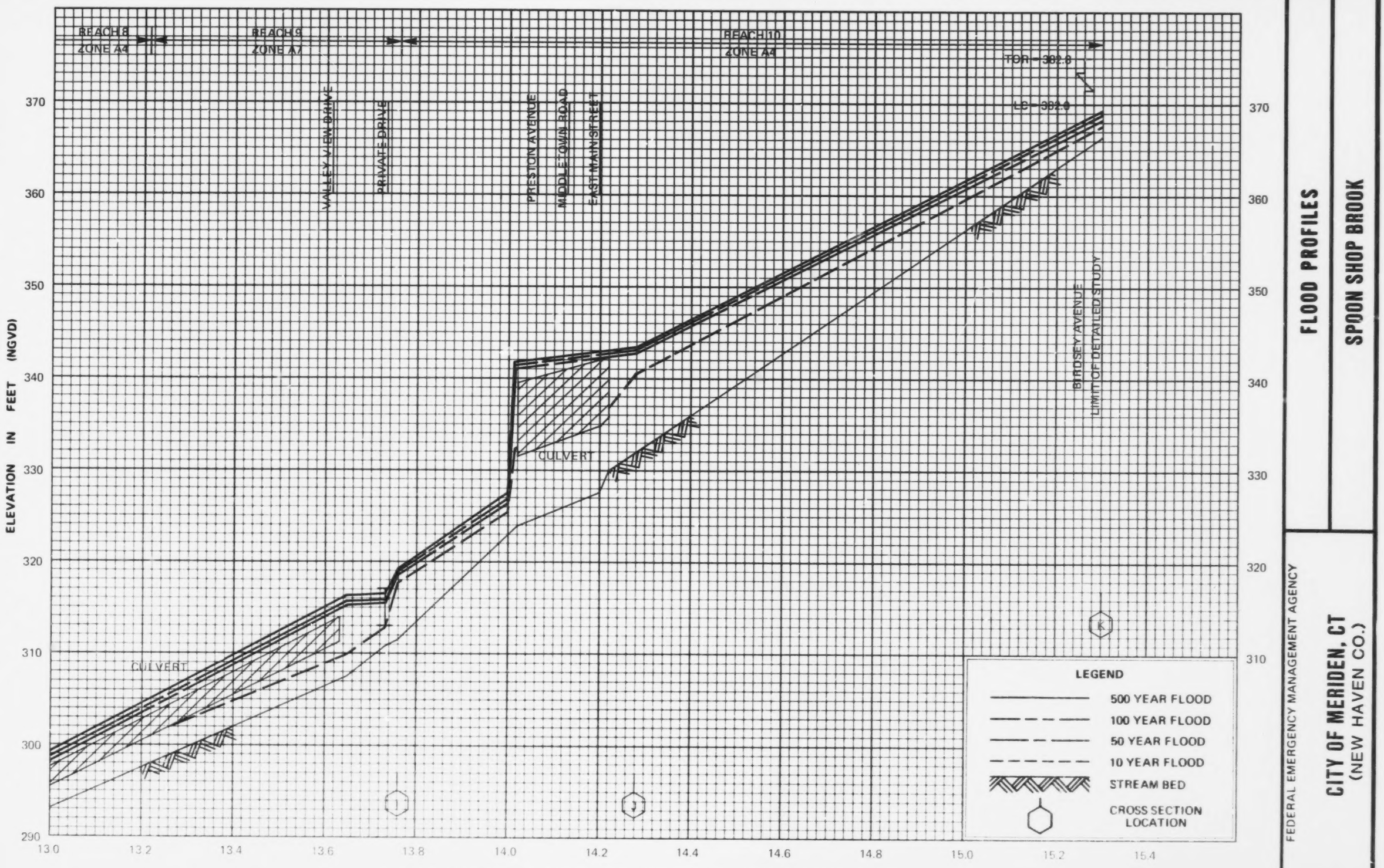

FLOOD PROFILES

SPOON SHOP BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

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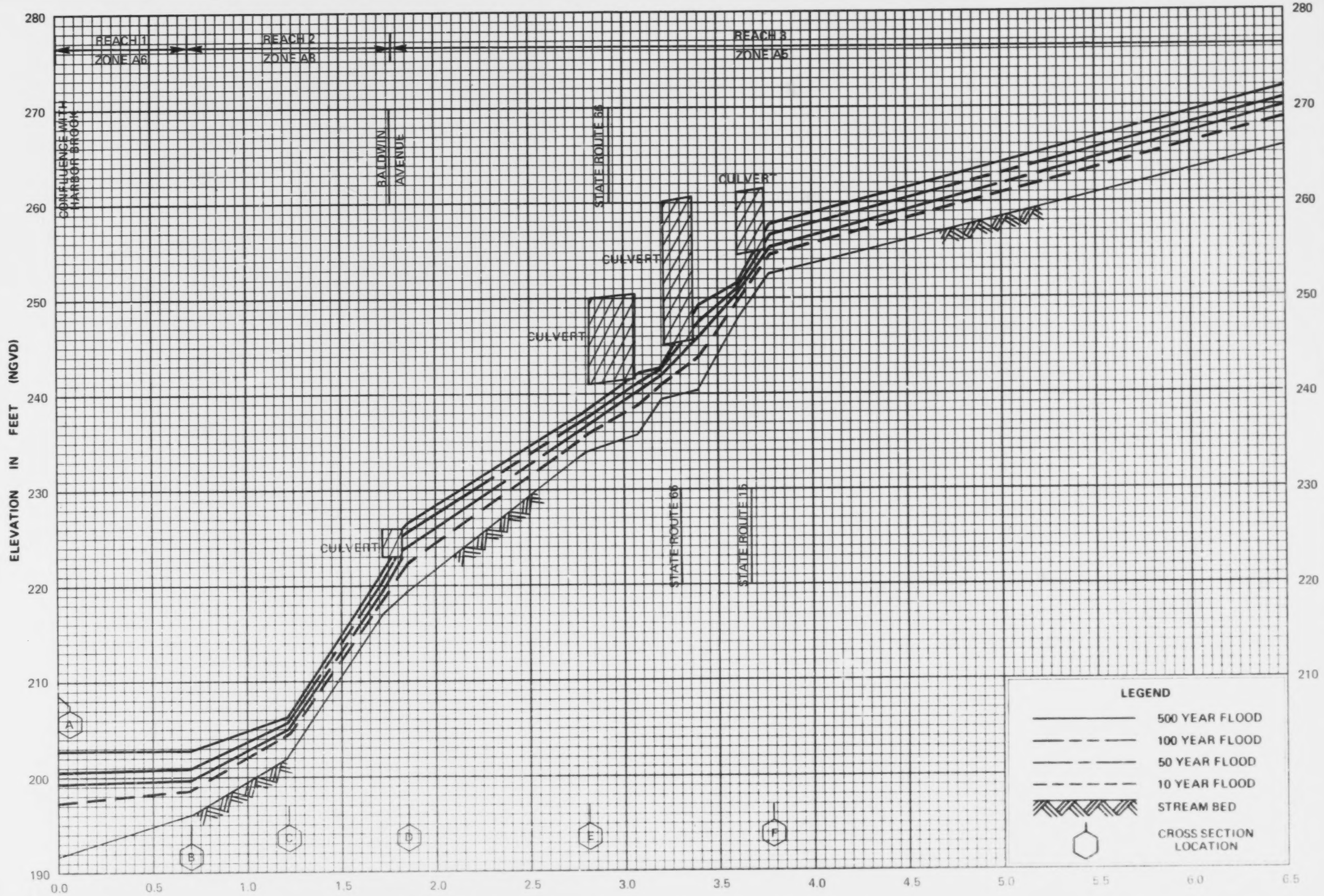

FLOOD PROFILES

WILLOW BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

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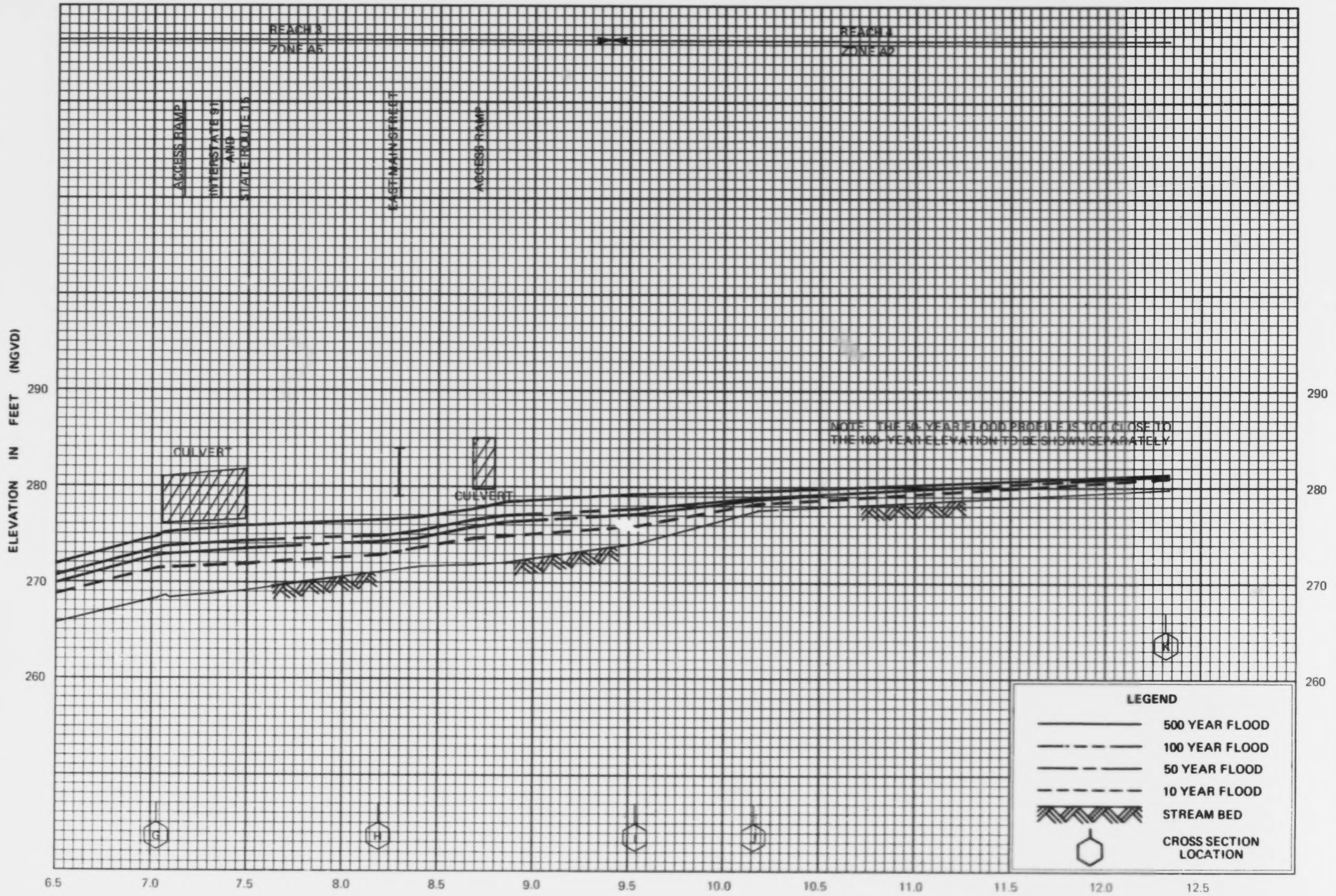

FLOOD PROFILES

WILLOW BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

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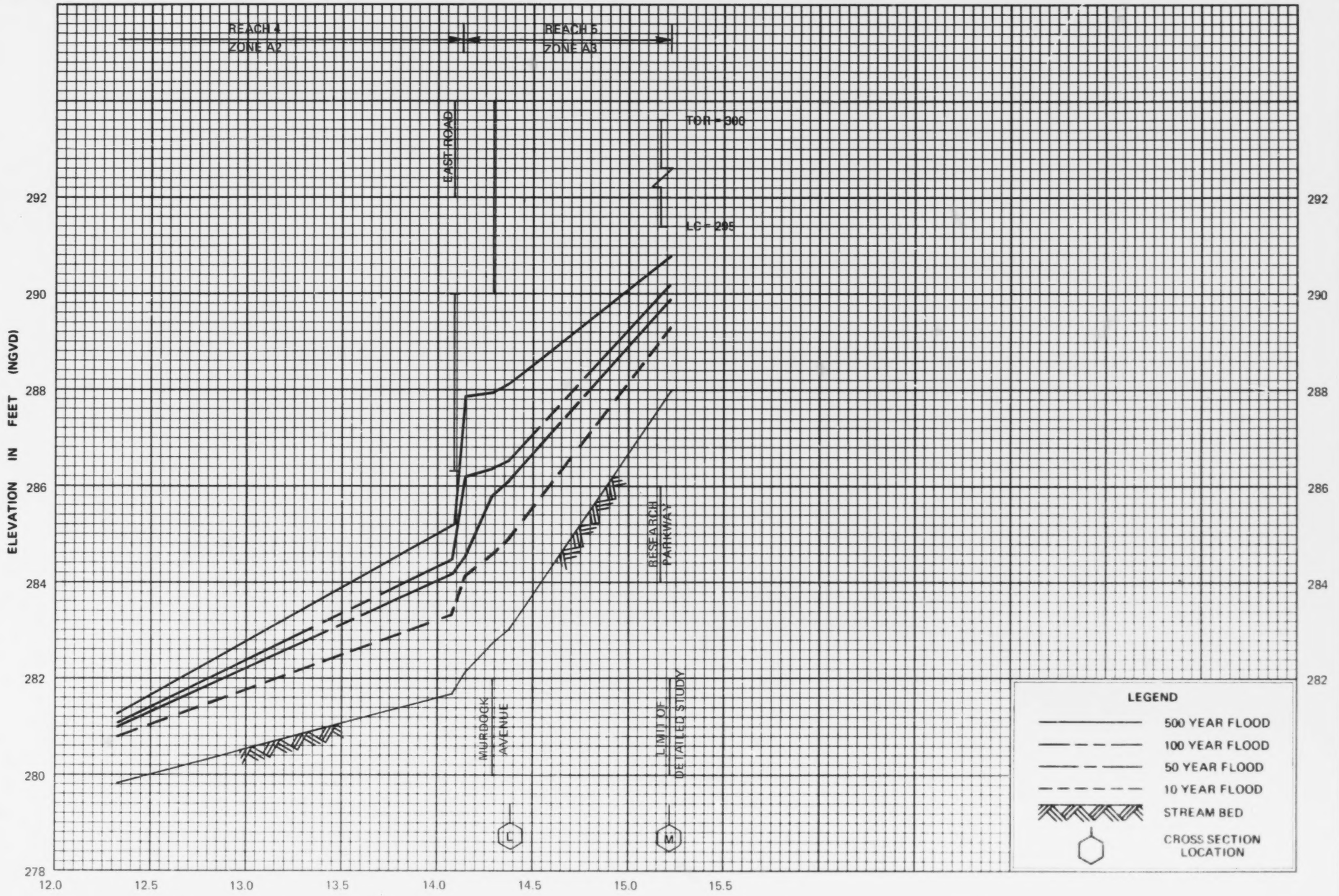

FLOOD PROFILES

WILLOW BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

13P

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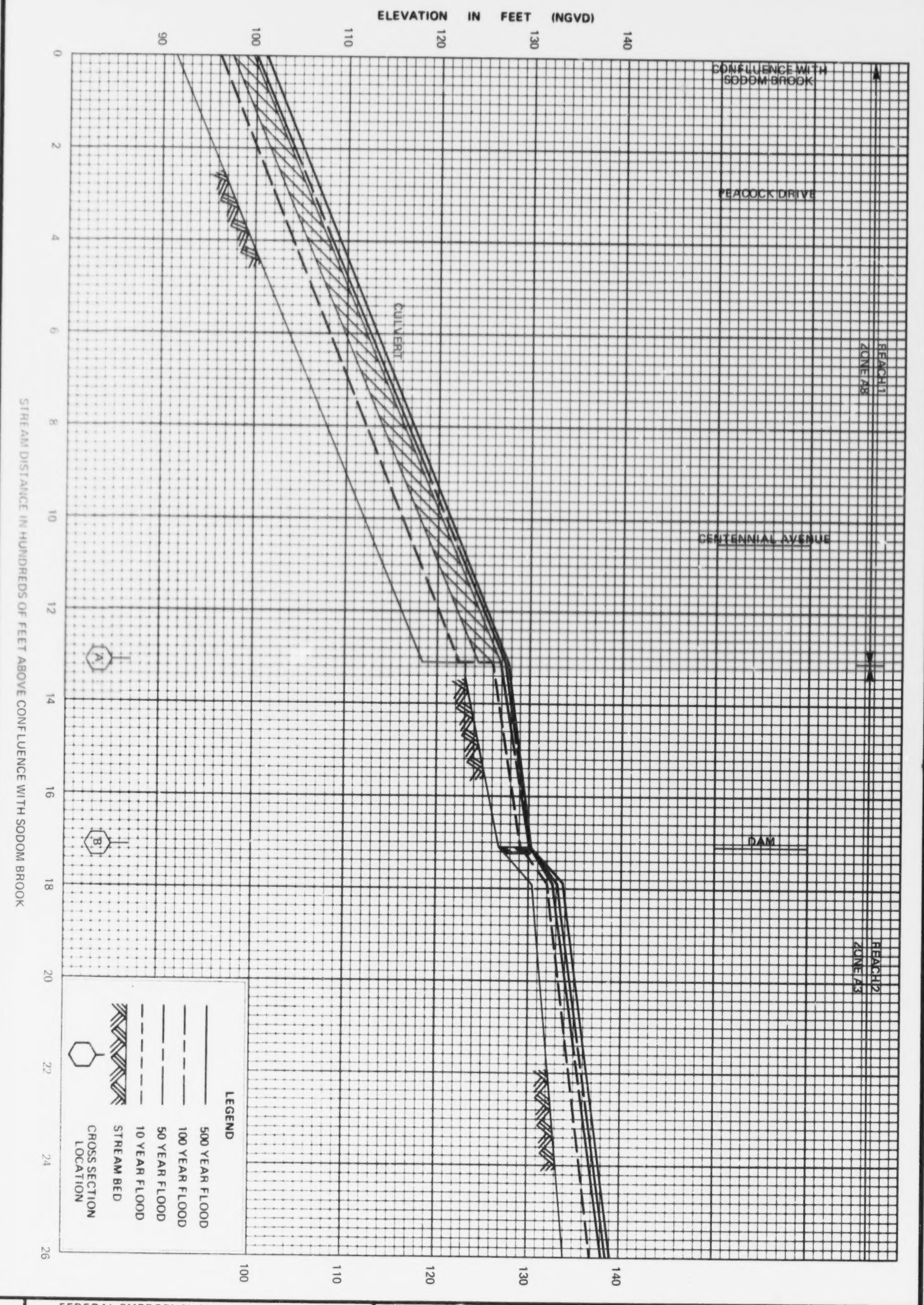

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

FLOOD PROFILES

CROW HOLLOW BROOK

14P

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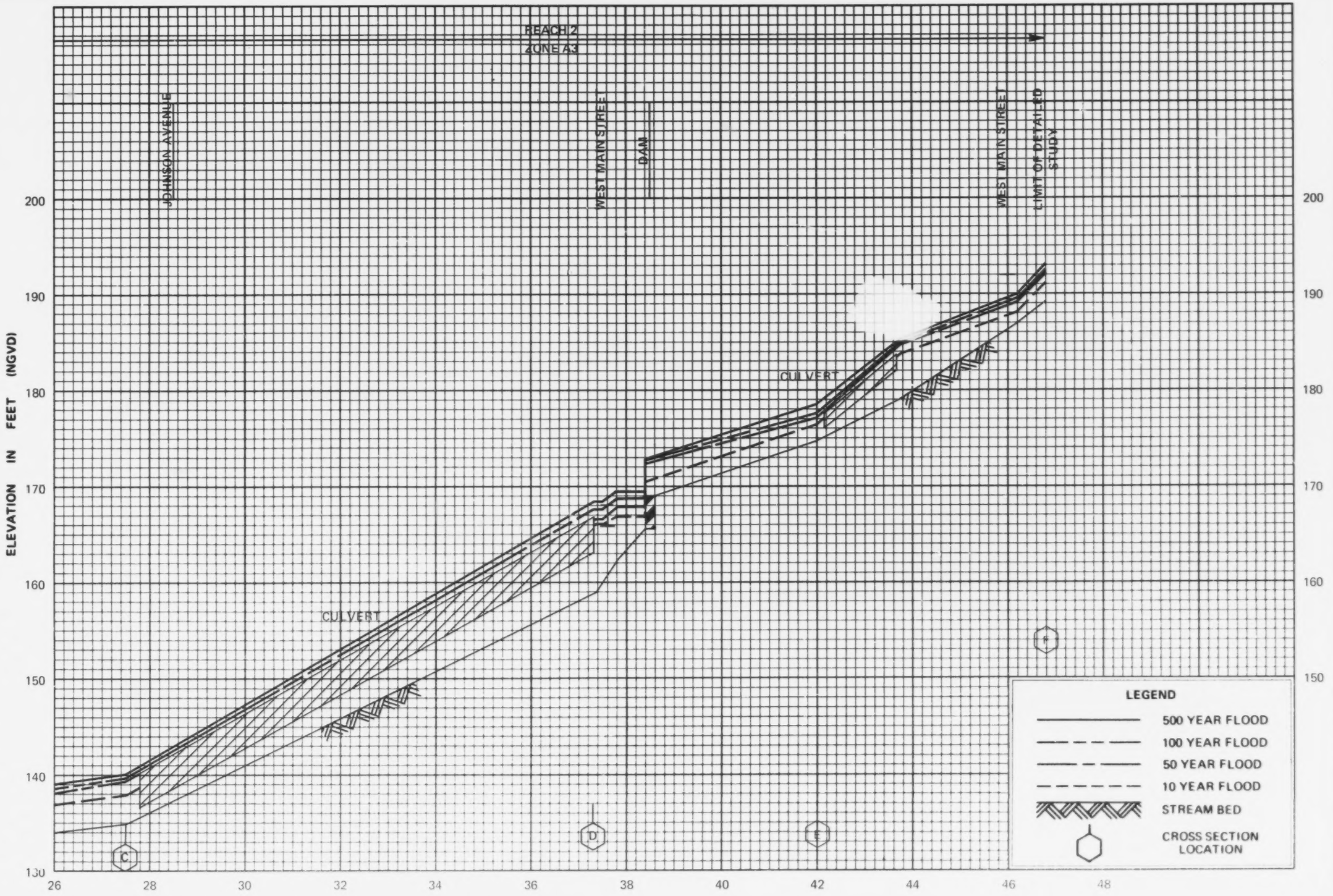

FLOOD PROFILES

CROW HOLLOW BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF MERIDEN, CT
(NEW HAVEN CO.)

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